COMSAT World Systems

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July 1, 1994

Mr. William F. Caton, Secretary
Federal Communications Commission
1919 M Street, NW
Room 222
Washington, D.C. 20554

RE: RM-7913

Dear Mr. Caton:

COMSAT Corporation, through its COMSAT World Systems line of business, hereby submits an original and five (5) copies of its "Petition for Partial Relief from the Current Regulatory Treatment of COMSAT World Systems' Switched Voice, Private Line, and Video and Audio Services" ("Petition for Partial Relief"). Accompanying this Petition for Partial Relief, and bound in separate volumes, are an original and five (5) copies of an Executive Summary, and a study by The Brattle Group entitled "Competition in the Market for Trans-Oceanic Facilities-Based Telecommunications Services," undertaken in conjunction with Dr. Hendrik S. Houthakker, Henry Lee Professor of Economics at Harvard University.

Please associate these filings with the above-captioned proceeding, as they are intended to update the record therein with current market information, and to modify the relief sought by COMSAT Corporation in its January, 1992 "Petition for Rulemaking to Modify the Regulatory Treatment of COMSAT World Systems' Multi-Year Fixed-Price Carrier-to-Carrier Contract-Based Switched-Voice Services." Specifically, this Petition for Partial Relief seeks immediate authority for COMSAT World Systems to file tariffs for all its Intelsat satellite services on a streamlined basis, with 14-days public notice, a presumption of lawfulness, and minimal cost support data.

If you have any questions regarding this submission, please contact the undersigned.

Respectfully submitted,

Howard Polsky

Howard D. Polsky

Enclosures

ORIGINAL

COMPETITION IN THE MARKET FOR TRANS-OCEANIC FACILITIES-BASED TELECOMMUNICATIONS SERVICES

Prepared for
COMSAT World Systems
Bethesda, Maryland

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June 24, 1994

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SECTION A: INTRODUCTION AND SUMMARY

I. INTRODUCTION AND SUMMARY

This report analyzes the markets in which COMSAT World Systems ("COMSAT") competes to determine the degree of competition that it faces in providing trans-oceanic facilities-based telecommunications services to and from the United States.

Since 1964, COMSAT has been the sole U.S. provider of international satellite communications services on the Intelsat system.[1] In that role, it has been subjected to full rate of return and tariff regulation by the Federal Communications Commission (FCC). In recent years, however, COMSAT's "monopoly" has been eroded dramatically by changes in regulatory policies and competitive market conditions. A fresh look at effective competition in the market for COMSAT's services is warranted in light of these changed circumstances.[2]

The most important features of today's marketplace for trans-oceanic facilities-based telecommunications services may be summarized as follows:

- COMSAT's market share is low and declining;
- The international telecommunications market is growing rapidly, with incumbents and new entrants expanding capacity at a very high rate;
- There is a large amount of idle capacity readily available on facilities competing with COMSAT;

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[1] COMSAT World Systems, a COMSAT Corporation line of business, is the U.S. Signatory to the International Telecommunications Satellite Organization ("Intelsat"). Intelsat is an international cooperative organization which owns, operates and manages a global satellite network. Today, Intelsat consists of 133 member nations represented by their signatories, which are currently a mix of government-owned postal and telecommunications administrations (PTTs) and private corporations.

[2] The FCC last reviewed the level of competition in the markets served by COMSAT nearly ten years ago. In 1985, the Commission concluded in its *International Competitive Carrier* proceeding, 102 FCC 2d 812, 838-39 (1985), that COMSAT was dominant in the provision of space-segment capacity. The Commission essentially relied upon its satellite-cable loading policy (which required COMSAT's carrier customers to allocate their international traffic between satellites and undersea cables) and the lack of competitive alternatives as the bases for this classification. *Id.* at n. 64. These conditions have since disappeared. The FCC has discontinued its facility loading policy, and competitive alternatives have emerged in the form of fiber optic cables and separate satellite systems. However, these changes have not yet been reflected in the regulatory oversight of COMSAT.

- Effective competition in this industry also takes place in the form of contracting for facilities prior to the time they go into service and from the threat of entry;
- The direct costs of trans-oceanic fiber optic cable and satellite technology are now fully competitive;
- COMSAT's customers are large, sophisticated buyers who in many cases also have their own competing facilities; and
- COMSAT has reacted to the competitive pressure by decreasing rates and introducing a variety of new service offerings.

For these reasons, this study concludes that COMSAT faces substantial effective competition in all geographic and service market segments from existing and planned fiber optic cables and separate satellite facilities, as well as from the threat of entry. Stated differently, while COMSAT possesses a legal monopoly on access to the Intelsat system in the U.S., that franchise no longer confers upon COMSAT any market power. In an environment characterized by effective competition, a streamlining of regulatory oversight would be appropriate.

COMSAT'S ROLE IN INTERNATIONAL TELECOMMUNICATIONS

This study focuses on the market for trans-oceanic facilities-based telecommunications services between the U.S. and overseas locations.[3] In this marketplace, COMSAT generally offers space segment capacity, pursuant to tariff or inter-carrier contracts, for trans-oceanic telecommunications services on Intelsat satellites. COMSAT's customers are primarily U.S. international service carriers (USISCs), multi-national corporations, and TV networks.

Because COMSAT does not serve most telecommunications end users directly, it is generally viewed as a "carrier's carrier." In that role, COMSAT is a "wholesale" supplier of trans-

[3] This does not include traffic between the contiguous states of the U.S., Alaska, Hawaii, Puerto Rico, U.S. Virgin Islands, Mexico, and Canada. Traffic from the U.S. mainland and Hawaii to the U.S. territories in the Pacific is included; traffic from the U.S. territories in the Pacific to other overseas locations is excluded. The scope of this study does not include trans-oceanic mobile telecommunications services, occasional use TV services, and cable restoration services.

oceanic satellite circuits and transponder leases to customers that provide "retail" international communications services to end users.

As a supplier of trans-oceanic telecommunications facilities, COMSAT represents only one choice among competing trans-oceanic facilities that customers can utilize to transmit and receive international telecommunications traffic to and from the U.S. Today, undersea fiber-optic cable systems represent a proliferating medium of choice for most USISCs in providing switched voice and private line services. Moreover, trans-oceanic cables may soon start to provide video and audio services. Separate satellite systems[4] now also compete actively with COMSAT in private line, video and audio, and (more recently) in switched voice services.[5]

Customers acquire capacity on competing cable and separate satellite systems through long-term commitments, either by ownership arrangements or explicit long-term contracts that often cover the useful life of a facility even before it is placed into service. With the emerging competition from fiber optic cables and separate satellite systems in the late 1980s, COMSAT has also supplemented its traditional monthly leases with long-term contract options. The shift to long-term commitments or ownership of capacity has caused the focal point of competition to shift from existing facilities to include competition for the pre-subscription of planned and potential facilities.

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[4] Separate satellite systems are non-Intelsat satellites competing in the market for trans-oceanic facilities-based telecommunication services. The fact that they were allowed to provide trans-oceanic service to and from the U.S. once differentiated them from strictly domestic or regional satellite systems. To protect the economic viability of the world-wide telecommunications satellite system, Intelsat (through its U.S. Signatory, COMSAT) originally had been granted the exclusive right to provide trans-oceanic satellite-based telecommunications services to and from the U.S. In the mid 1980s, however, the FCC authorized other international satellite systems separate from Intelsat ("separate satellite systems") to compete with COMSAT and Intelsat. Domestic and regional satellite systems also have been allowed to provide trans-oceanic services to the extent their coverage area allows. As a result, COMSAT is no longer the exclusive U.S. provider of trans-oceanic telecommunications satellite services.

[5] Since separate satellite systems have started operations in 1988, the largest existing separate satellite system, PanAmSat, has already grown to $40 million in 1992 revenues with a net income of more than $17 million. By 1998, PanAmSat expects to grow to approximately $320 million in revenues with a net income of $97 million. (*See* PanAmSat SEC Form S-1, filed May 25, 1993 at A-7 (hereinafter "PAS SEC Form S-1 at __").) By comparison, COMSAT's total Intelsat service revenues in 1992 were $253 million. (*See* 1992 COMSAT SEC Form 10-K at 3).

Beyond this, COMSAT is in the unusual situation where its main customers are also its strongest competitors. COMSAT's three main USISC customers (AT&T, MCI, and Sprint), accounting for the majority of COMSAT's total demand, are vertically integrated companies that own most of the competing trans-oceanic cable facilities. **Table 1** shows that each of these corporations dwarfs COMSAT in size by factors ranging from 10 to 200.

TABLE 1

COMPARISON OF COMSAT CORPORATION AND ITS MAJOR USISC CUSTOMERS

Company	1993 Revenues	1993 Operating Income	1993 Total Assets	Employees
COMSAT	$0.6 billion	$138 million	$1.7 billion	1,527
AT&T	$67.2 billion	$6,238 million	$60.8 billion	308,700
MCI	$11.9 billion	$1,268 million	$11.3 billion	36,235
Sprint	$11.4 billion	$1,251 million	$14.1 billion	52,500

Source: 1993 Annual Reports. Sprint Employees from Value Line April 15, 1994.

The fact that many of COMSAT's customers also own capacity on trans-oceanic cable systems gives them little incentive to establish additional telecommunications circuits through COMSAT as long as idle capacity exists on their own facilities. These customers as well as most others, such as large television broadcasters and international corporations, are highly sophisticated and possess enormous bargaining power.

GROWTH OF THE INTERNATIONAL TELECOMMUNICATIONS INDUSTRY

International telecommunications service is a large and rapidly expanding business. The need for trans-oceanic facility-based telecommunication services is driven by the demand for "retail" international telecommunications service to end users. More than 1.5 billion voice messages totalling approximately 10 billion minutes were transmitted between the U.S. and overseas locations in 1992. In 1992, trans-oceanic switched voice services also amounted to approximately $5.5 billion in retained revenues from traffic originating or terminating in the

U.S.[6] This compares to 1985 retained revenues of only $1.8 billion[7] and represents an average annual growth rate of 17.5 percent.

Figure 1 (on page 7) illustrates the growth in switched voice traffic of USISCs to and from the U.S. measured in number of messages, minutes, and revenues. The three measures of telecommunications traffic show very high growth rates, averaging between 16 and 22 percent annually from 1985 through 1992. These growth rates show that traffic doubles approximately every four years. As a result, utilized capacity for switched voice services has increased significantly despite the fact that digital compression technology already packs about three voice circuits into the capacity traditionally required for one.[8]

Demand for private line, and video and audio services is growing at a very similar pace. In fact, utilized capacity for trans-oceanic private line, video and audio services to and from the U.S. has quadrupled between 1988 and 1993.[9]

In addition, the number of trans-oceanic telecommunications facilities and players in the market has grown dramatically. To keep pace with demand, USISCs have increased rapidly the number of telecommunication circuits that serve overseas locations. Between 1987 and 1993, available

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[6] FCC Common Carrier Bureau, Industry Analysis Division, *Preliminary 1992 Section 43.61 International Telecommunications Data* (Sep. 1993). (Excludes telecommunications traffic to and from Canada, Mexico, and non-contiguous U.S. points.) Retained revenues equal billed revenues minus net foreign settlement charges.

[7] FCC Common Carrier Bureau, Industry Analysis Division, *International Communications Service Data 1985-1988: A Summary* (Dec. 21, 1989).

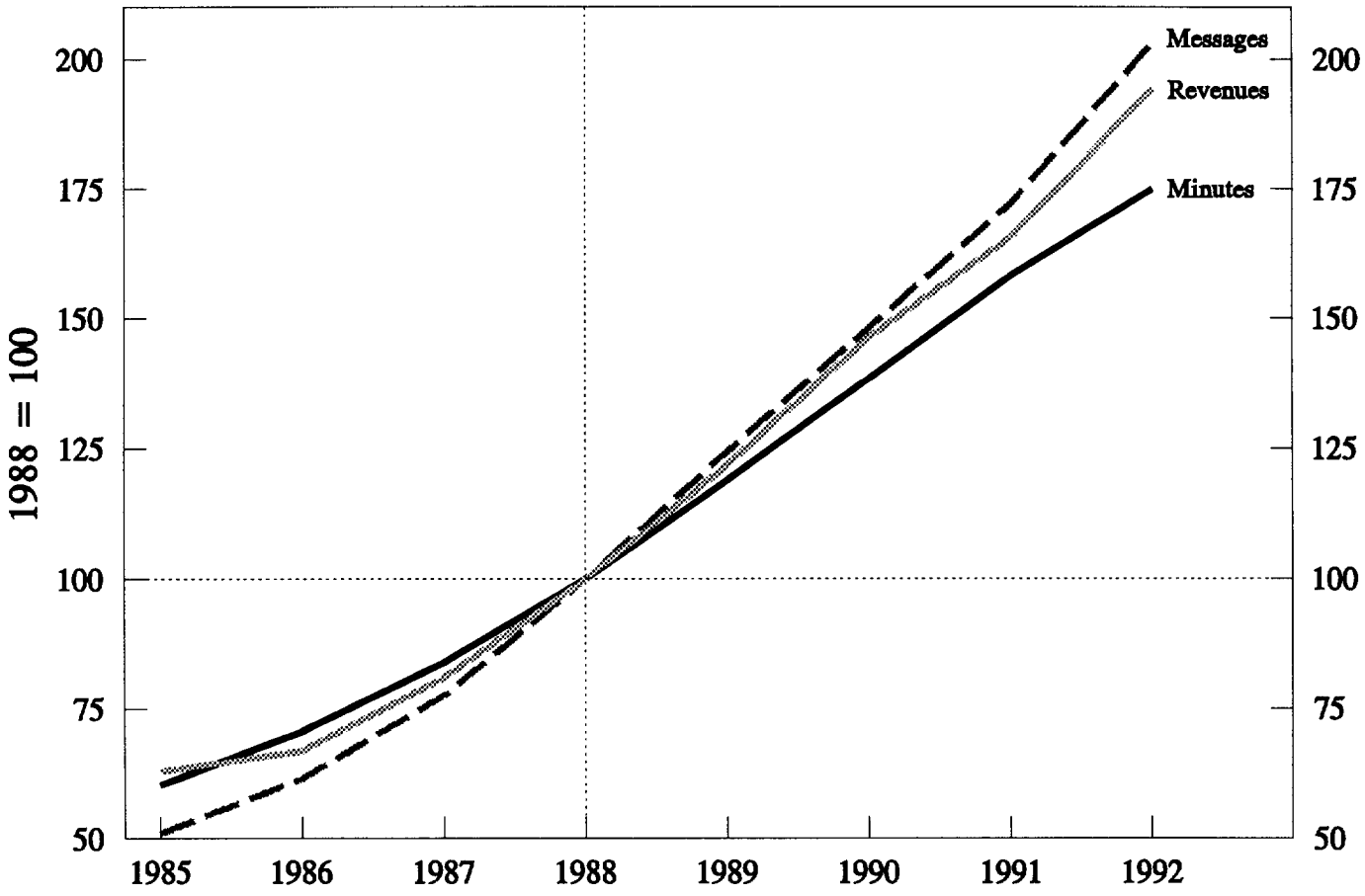
[8] For a discussion of utilized capacity for switched voice service, see Chapter VI. Note that AT&T's average compression rate on leased COMSAT circuits has increased from 1.1 in 1988 to 2.6 in 1993 (*See* Exhibit HSH-3).

[9] *See* Chapters VI and VII.

Figure 1

Growth in Retail Telecommunications Traffic of USISCs

(Switched Voice Service in Messages, Revenues and Minutes to and from the U.S.)



NOTES:

Excludes Canada, Mexico, and non-contiguous U.S. points.

Sources: FCC International Communications Service Data 1985-1988: A Summary.
FCC International Communications Traffic Data Report 1989, 1990, and 1991.
FCC Preliminary 1992 Section 43.61 International Telecommunications Data.

trans-oceanic capacity more than quadrupled. By 1996, additions of *planned*[10] facilities will, again, more than double currently available capacity.[11]

DECLINING COMSAT MARKET SHARES

The rapid growth of trans-oceanic telecommunications demand has resulted in a large number of new facilities that compete directly with COMSAT. Since 1988, COMSAT has lost significant market share to fiber optic cable and separate satellite systems. **Figure 2** (on page 9) shows the total market size of trans-oceanic switched voice, private line, video and audio services measured in utilized capacity to and from the U.S.[12] While the total market has almost doubled, COMSAT has experienced only very modest increases. Simply stated, COMSAT's market share of total utilized capacity to and from the U.S. has dropped from more than 70 percent in 1988 to approximately 45 percent in 1993.

This trend is representative of the situation that COMSAT faces for its services world-wide, although market shares vary across different services and geographic regions. In the interest of being conservative, this study analyzes market shares for individual service categories and geographic market segments.

OUTLINE OF THE STUDY

To assess the competitiveness of trans-oceanic facilities-based telecommunications services, the remainder of this report is divided into two sections. Section B discusses the methodology, data

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[10] Throughout this report, facilities referred to as *planned* facilities are those which have been authorized by the FCC (and/or are already under construction) and will come on line before the end of 1996. For this study, 1996 is chosen as a reasonable time horizon to identify planned facilities. In order to come on line before the end of 1996, cable and satellite projects will already be sufficiently advanced in planning, pre-subscription, and/or construction stages to consider their market entry more a matter of fact than threat.

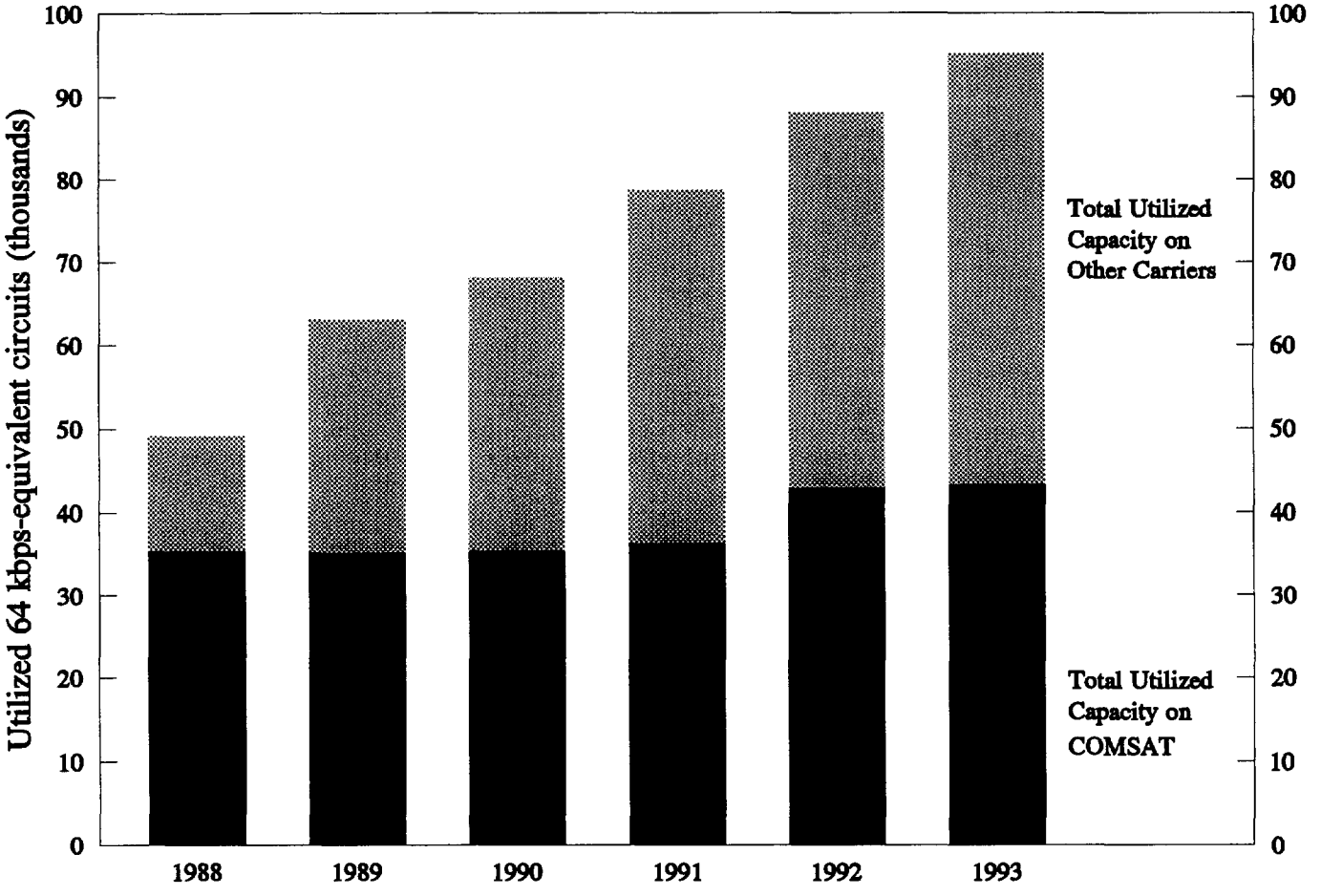
[11] *See* Chapter VIII.

[12] Total utilized capacity has grown less rapidly than private line, video and audio, and retail switched voice services. The reason is the successful introduction of digital compression technology for trans-oceanic facilities-based switched voice service.

Figure 2

Utilized Capacity for Trans-Oceanic Service: COMSAT vs. Other Carriers

(Utilized 64 kbps-equivalent circuits to and from the U.S.)



NOTES:

One 36/27 Mhz-equivalent transponder lease is equal to 275 64 kbps-equivalent duplex circuits.

Does not include utilized capacity for switched voice and private line services on separate satellite systems.

See Chapter V for a further discussion of data sources and assumptions.

Source: Exhibits HSH-5.1 and HSH-6.1

and assumptions used in this study. Section C applies these principles to the market data and presents the analysis of effective competition.

Within Section B, Chapter II defines market power and identifies the principles of market segmentation to analyze effective competition. This chapter also explains how market power should be measured.

Chapter III discusses the implications of the three dimensions of competition in this industry: (1) competition from existing facilities; (2) competition from planned facilities; and (3) competition from the threat of entry.[13]

Chapter IV identifies and describes the services and geographic market segments used to determine the degree of effective competition.

Chapter V discusses briefly the data sources and assumptions used in this study. Detailed data on COMSAT and AT&T utilized capacity are used to estimate the total utilized capacity for switched voice and private line services for each geographic market segment. For video and audio services, it was possible to estimate the total volume in utilized capacity and in revenues. These estimates are based on publicly available data from operators of separate satellite systems and from COMSAT.

Turning to Section C, Chapter VI examines the degree of effective competition in switched voice and private line services. Although the level of competition from existing facilities varies across regions, the data show that COMSAT faces substantial effective competition in providing switched voice and private line services in all geographic market segments. This conclusion also holds true individually for switched voice services and for private line services.

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[13] Competition from the threat of entry includes (1) the threat of new trans-oceanic facilities entering the market and (2) the threat that existing facilities enter market segments they have not been serving in the past. In the economic literature, competition from the threat of entry is also referred to as competition from "potential" entry and is defined as "the possibility of new competition from firms who are not currently producing competing products" (D. Pearce, *The MIT Dictionary of Modern Economics*, 3rd ed., 1989). Potential entry is a very real and effective type of competition that this industry faces today.

Chapter VII applies a similar analytical structure to video and audio services. Although market shares in some regions are still high, COMSAT currently faces substantial competition in all geographic market segments. Competition from planned facilities, the threat of entry of new facilities, and the fact that existing and planned fiber optic cable systems may soon provide trans-oceanic video and audio services all preclude COMSAT from obtaining market power.

Chapter VIII quantifies the amount of total available and idle capacity that currently exists for services to individual geographic market segments. Available capacity has been growing at a rapid pace. Further limiting COMSAT's market power, cable competitors currently have sufficient idle capacity to absorb all of COMSAT's traffic to regions that are easily accessible by existing and planned cable systems. Similarly, existing and planned separate satellite systems will be able to accommodate most or all of COMSAT's traffic to regions where cable does not yet compete.

Chapter IX discusses other evidence of effective competition facing COMSAT today. The analysis shows that: (1) a rapid decline in costs has made fiber optic technology highly competitive with satellite technology; (2) COMSAT's customers are large, very sophisticated and have enormous bargaining power; (3) the absence of significant geographic rate differentiation effectively constrains COMSAT's market power in geographic areas that face less competition from existing and planned cable systems; (4) COMSAT's rates have declined significantly since intermodal and intramodal competition have emerged; and (5) COMSAT has responded to increased competition by introducing a variety of new rates and service offerings.

SECTION B: METHODS OF ANALYSIS

II. METHODS FOR DEFINING AND MEASURING MARKET POWER

ECONOMIC DEFINITIONS

Economic Concept of Market Power

Economists generally agree that a firm has "market power"[14] if, absent regulation, it can raise and maintain prices above competitive levels.[15] Market power may also be thought of as the absence of effective competition. Hereafter, this study shall refer either to "market power" or the absence of "effective competition."

Firms with market power have the ability to raise prices above competitive levels, restrain the choice of products or services available to customers, restrict the volume of services available to customers, and control the process of innovation. In those situations, economic regulation of rates and entry is generally regarded as a means to control the exploitation of market power and thus to ensure that customers receive the benefits of competitive prices, *i.e.*, those that

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[14] Sometimes the terms market power and monopoly power are used synonymously. However, I shall simply use market power in the sense defined above.

[15] This definition of market power is consistent with that of the Supreme Court: "the power to control prices or exclude competition." *United States v. E.I. duPont de Nemours & Co.*, 351 U.S. 377 (1956). It is also consistent with the standard posed by the Department of Justice and Federal Trade Commission in *The 1992 Horizontal Merger Guidelines Commentary and Text*, ABA Antitrust Section (1992) ("*Merger Guidelines*"):

> Market power to a seller is the ability profitably to maintain prices above competitive levels for a significant period of time. [footnote omitted] In some circumstances, a sole seller (a monopolist) of a product with no good substitutes can maintain a selling price that is above the level that would prevail if the market were competitive. *Merger Guidelines* §0.1.

Most economists would offer similar definitions. *See* Landes and Posner, *Market Power in Antitrust Cases, 94 Harv. L. Rev.* 937 (1981):

> The term "market power" refers to the ability of a firm (or a group of firms, acting jointly) to raise price above the competitive level without losing so many sales so rapidly that the price increase is unprofitable and must be rescinded.

would have occurred had the regulated firm been subject to effective competition.[16] Conversely, a regulated firm that has lost market power because of the emergence of effective competition may not be able to compete fully if regulation restricts pricing flexibility relative to unregulated competitors or if it prevents the firm from pricing at the competitive level. In such cases, the public interest would require regulation to adjust to these changes in market power to ensure a level playing field and fair competition.

Economic Concept of a "Relevant Market"

To be meaningful, the concept of market power must refer to an appropriately defined market in which a firm is purported to have power. Analysis of effective competition therefore often begins with a structural analysis of the "relevant markets" in which the firm operates, typically consisting of relevant product and geographic markets.[17] A relevant market may be thought

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[16] *See* J. Bonbright, A. Danielsen, and D. Kamerschen, *Principles of Public Utility Rates* (Public Utilities Reports, Inc., Arlington, VA, 1988), at 158:

> . . .rate regulation must necessarily try to accomplish the major objectives that unregulated competition is designed to accomplish. . . .

[17] *See Merger Guidelines* regarding product markets:

> Absent price discrimination, the Agency will delineate the product market to be a product or group of products such that a hypothetical profit-maximizing firm that was the only present and future seller of those products (monopolist) likely would impose at least a "small but significant and nontransitory" increase in price. (*Merger Guidelines* §1.11.)

Regarding geographic markets:

> Absent price discrimination, the Agency will delineate the geographic market to be a region such that a hypothetical monopolist that was the only present or future producer of the relevant product at locations in that region would profitably impose at least a "small but significant and nontransitory" increase in price, holding constant the terms of sale for all products produced elsewhere. (*Merger Guidelines* §1.21.)

For further discussion of geographic markets, *see* W. Curran III, "Relevant Markets in Antitrust," *The Journal of Reprints for Antitrust Law and Economics*, Vol. XIV, No. 2 (1984).

In the presence of price discrimination, the *Merger Guidelines* state that ". . .the Agency may delineate different relevant markets corresponding to each buyer group." (*Merger Guidelines* §1.0.) As explained below, geographic rate differences are becoming a thing of the past for COMSAT. Furthermore, (continued...)

of as the collection of goods or services over which a hypothetical firm (consisting of all suppliers to the market) could exercise market power.[18] It is sometimes said that a market is defined when there is a "marked gap in the chain of substitutes."[19]

Defining relevant markets involves identification of (1) all of the alternative products and geographic areas to which buyers would turn and (2) all sellers of identical products, close substitutes, and potential new entrants that would respond if a firm attempted to exercise power over price. The end result of identifying all competing products and all sellers is a relevant market for an analysis of effective competition.

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[17](...continued)
COMSAT's intercarrier contracts specify that customers have rights to lower rates granted to other carrier customers. Lastly, the disaggregation of services and geographic areas responds to the concerns of the *Merger Guidelines* by accounting for the major buyer groups.

[18] *See Merger Guidelines*:

> . . .the Agency evaluates the likely competitive impact of a merger within the context of economically meaningful markets — i.e., markets that could be subject to the exercise of market power. (*Merger Guidelines* §1.0.)

Most economists would agree. *See, e.g.*, R. Schmalensee, "Standards for Dominant Firm Conduct: What Can Economists Contribute?" in J. Vickers and D. Hay, *The Economics of Market Dominance* (New York: Basil Blackwell, 1987) at 63.

> For the purposes of assessing market power, it is logical to follow Areeda and Turner (1978, p. 347) and define a relevant market for antitrust purposes as 'a firm or group of firms which, if unified by agreement or merger, would have market power.' In other words, a market is an aggregation (over space and/or products) of outputs that could profitably be monopolized, at least in the short run. (The smallest such aggregate should generally be the focus of analysis.)

[19] J. Robinson, *The Economics of Imperfect Competition* (1933), at 5-6.

ASSESSING THE EXISTENCE OF MARKET POWER

Demand Substitution and Supply Substitution as Constraints on Market Power

Having defined the concepts of market power and the relevant market in which it could be exercised, the next step is usually to identify constraints on a firm's market power. These usually take the form of *demand substitution* and *supply substitution.*[20]

The firm's customers may switch to alternative suppliers of the same product or to suppliers of close substitutes, in response to a firm's attempt to raise prices.[21] This loss of business to competitors may in turn make the price increase unprofitable. If so, the availability of substitutes prevents the firm from exercising power over price, and the firm's market power is said to be nonexistent because of *demand substitution.*

Supply substitutability measures the ability of a service provider to shift its resources from providing one product or service to another product or service in response to changes in market conditions, such as higher prices set by a firm in an attempt to exercise market power. If alternative service providers would supply the market whenever the firm raised prices and thereby make such an attempt unprofitable, then the firm has no market power because of *supply substitution.*[22]

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[20] For a discussion of the difference between demand substitution and supply substitution, *see* F. Fisher, "Diagnosing Monopoly," *Quarterly Review of Economies and Business*, Vol. 19, No. 2 (Summer, 1979), at 7-33; reprinted in J. Monz, *Industrial Organization, Economics and the Law* (Cambridge, MA: MIT Press, 1991).

[21] This concept is often referred to as "cross-elasticity." *See* J. Greenfield, *The Use of Economists in Antitrust Litigation* (American Bar Association, Antitrust Law Section, 1984), at 7.

> In antitrust cases, product market boundaries are generally determined by cross-elasticity of demand — i.e., "the responsiveness of the sales of one product to price changes of the other." [footnote omitted] Two different products will likely be grouped as part of a single product market if they can be used interchangeably and have a high cross elasticity of demand — that is, increased demand of one results from an increase in the price of the other.

[22] *See* F. Scherer and D. Ross, *Industrial Market Structure and Economic Performance* (Boston, Houghton Mifflin Company, 1990), at 17-18:

(continued...)

The two key factors affecting supply substitutability are the ability of existing suppliers to provide similar competing services and the ability of new suppliers to enter the market. The ease of entry hinges on the existence of entry barriers.[23] The lack of substantial entry barriers permits a supplier to shift its facilities and resources from providing one service to providing another service.

Competition from Existing Facilities

Data on the availability and utilization of existing facilities to which buyers could turn may provide evidence of both supply substitution and demand substitution. However, a simple measure cannot quantify the full extent of effective competition from services provided by existing facilities.

For example, market share is one factor used in determining the presence of effective competition from existing facilities.[24] If COMSAT's market share is low in the competition

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[22](...continued)

> . . .significant entry barriers are the *sine qua non* of monopoly and oligopoly, for as we shall see in later chapters, sellers have little or no enduring power over price when entry barriers are nonexistent.

[23] *See* D. Pearce, *The Dictionary of Modern Economics*, 3rd ed. 1989, at 36, defining barriers to entry as: "Factors which place new entrants at a cost disadvantage relative to established firms within an industry." *See also* "Concepts and Effects of Barriers to Entry," *The Journal of Reprints for Antitrust Law and Economics*, Vol. XIV, No. 1 (1983).

[24] The use of market shares is also consistent with the FCC's methodology in previous proceedings. (*See Competition in the Interstate Interexchange Marketplace*, 6 FCC Rcd 5880 (1991) (*"Interexchange Marketplace"*). For this reason, this study shall focus on COMSAT's market share, since its alleged market power is at issue.

The Department of Justice and Federal Trade Commission also use the Herfindahl-Hirschman Index (HHI) to measure market power for the purpose of considering whether to challenge mergers with anticompetitive potential. However, calculation of the HHI for a market segment requires information of the market shares of all firms, which may not be available in many of the market segments of interest here. For a discussion of HHI, *see* R. Miller, "The Herfindahl-Hirschman Index as a Market Structure Variable: An Exposition for Antitrust Practitioners," *The Antitrust Bulletin*, Vol. 27 (1983), at 593-618; "Statement by Attorney General William French Smith Releasing the New Department of Justice Merger Guidelines" (June 14, 1982): *The Antitrust Bulletin*, Vol. 26 (Fall, 1982), at 619-301; and P. Pautler, "A Guide to the Herfindahl Index for Antitrust Attorneys," *Research in Law and Economics*, Vol. 5 (1983), at 167-190.